Applicant: Xiao Chen
Serial No.: 09/667,077
Group Art Unit: 2121

IN THE CLAIMS:

Please amend the following claims having the same number as indicated:

1. (Original) A method for providing a simulation of a welding process using integrated models, the integrated models being interconnected by an interconnection tool to determine stresses and distortions of a material being welded, including the steps of:

determining a model of a geometry of the material;

defining a set of coordinates of elements and nodes of the geometry model for a finite element analysis mesh;

delivering the finite element analysis mesh coordinates to a thermal analysis model, the thermal analysis model including an analytical solution model and a finite element analysis model;

determining a thermal analysis of the welding process as a function of at least one of the analytical solution model and the finite element analysis model, the analytical solution model being adapted to provide a thermal history of the welding process for a global distortion analysis, and the finite element analysis model being adapted to provide a thermal history of the welding process for a detailed residual stress analysis;

delivering the thermal history of the welding process to a structural analysis model; and

providing a structural analysis of the welding process as a function of the thermal history.

2. (Original) A method, as set forth in claim 1, wherein providing a thermal history of the welding process for a detailed residual stress analysis includes the step of providing a thermal history of the welding process for a specific portion of the welding process.

3. (Original) A method, as set forth in claim 1, wherein providing a structural analysis of the welding process includes the step of modeling a set of characteristics of the materials being welded during the welding process.

4. (Original) A method, as set forth in claim 3, wherein characteristics of the materials include residual stresses and distortions.

5. (Original) A method, as set forth in claim 1, wherein determining a thermal analysis of the welding process as a function of the analytical solution model includes the steps of:

determining a set of adiabatic boundary conditions of the material being welded;

determining a set of reflected heat sources as a function of the adiabatic boundary conditions;

determining a set of point heat sources as a function of the reflected heat sources; and

determining a total analytical solution from superposition of the point heat sources.

6. (Original) A method, as set forth in claim 1, wherein determining a thermal analysis of the welding process as a function of the finite element analysis model includes the step of determining a set of numerical computations of conditions at each desired node and element coordinate of the finite element analysis mesh.

7. (Original) A method, as set forth in claim 1, wherein delivering the thermal history of the welding process to a structural analysis model includes the step of delivering the thermal history by way of an interface module.

8. (Original) An apparatus for providing a simulation of a welding process using integrated models, the integrated models being interconnected by an

interconnection tool to determine the stresses and distortions of a material being welded, comprising:

a geometry modeler adapted to determine a model of a geometry of the material;

a meshing tool adapted to define a set of coordinates of elements and nodes of the geometry model for a finite element analysis mesh;

a thermal analysis model adapted to receive the finite element analysis mesh, determine a thermal analysis of the welding process, and responsively provide a thermal history of the welding process, wherein the thermal analysis model includes:

an analytical solution model adapted to provide a thermal history of the welding process for a global distortion analysis; and

a finite element of analysis model adapted to provide a thermal history of the welding process for a detailed residual stress analysis; and

a structural analysis model adapted to provide a structural analysis of the welding process as a function of the thermal history.

9. (Original) An apparatus, as set forth in claim 8, wherein the interconnection tool is a graphical user interface.

10. (Currently Amended) A method for determining a thermal analysis of a welding process as a function of an analytical solution model for use in a simulation of a welding process, including the steps of:

determining a set of adiabatic boundary conditions of a material being welded;

determining a set of reflected heat sources as a function of the adiabatic boundary conditions;

determining a set of point heat sources as a function of the reflected heat sources; ~~and,~~

determining a total analytical solution from superposition of the point heat sources;

determining a thermal analysis of the welding process as the total analytical solution and one of an analytical solution model or a finite element analysis model, the analytical solution model being adapted to provide a thermal history of the welding process for a global distortion analysis, and the finite element analysis model being adapted to provide a thermal history of the welding process for a detailed residual stress analysis;

delivering the thermal history of the welding process to a structural analysis model; and

providing the structural analysis of the welding process as a function of the thermal history.

REMARKS

No new matter is added by this amendment. The present application was filed on September 9, 2000 with original claims 1-9. By this amendment, new claim 10 has been added. The claims remaining in consideration are claims 1-10. Reconsideration is respectfully requested.

All of the Examiner's objections and rejections having been successfully traversed, applicants respectfully assert that the present application is now in condition for allowance. An early notice of allowance is solicited.

Applicant believes that no fees are due, however, if any become required, the Commissioner is hereby authorized to charge any additional fees or credit any overpayments to Deposit Account 08-2789. Further and favorable reconsideration of the outstanding Office Action is hereby requested.

Respectfully submitted
HOWARD & HOWARD ATTORNEYS, P.C.

March 19, 2004
Date

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